

What is claimed is:

1. A digital television receiver comprising:
an antenna receiving channel signals of digital
television broadcasting and having a directionality
dependent on a control signal;
a signal processing part tuning a wanted channel signal
from the channel signals and processing the tuned
channel signal as a wanted form;
10 a detection part detecting state signals of the channel
signal outputted from the signal processing part;
a memory, when every new state signal is detected,
storing the detected new state signal sorted with
previously-detected state signals;
15 a control part producing the control signal
corresponding to an optimal direction of the antenna by
comparing the new state signal to the previous state
signals; and
an interface part providing the antenna with the control
20 signal.
2. The digital television receiver of claim 1, wherein
the antenna includes a smart antenna.

- 25 3. The digital television receiver of claim 1, the
signal processing part comprising:

a tuner tuning a wanted channel signal from channel signals received through the antenna;

an intermediate frequency automatic gain control part controlling automatically an intermediate frequency gain

5 of the channel signal tuned by the tuner; and

a receive chip taking a signal having a wanted form from an output signal of the intermediate frequency automatic gain control part and providing the detection part with the taken signal.

10

4. The digital television receiver of claim 3, wherein the receive chip is a VSB receive chip for getting a VSB(vestigial side band) signal.

15

5. A digital television receiver comprising:

an antenna having a directionality according to a control signal;

a signal processing part making a digital television channel signal from the antenna have a signal of a predetermined form;

20 a detection part attaining state signals from an output signal of the signal processing part wherein the state signals include a power of the channel signal, a power of a ghost signal, and a signal vs. noise ratio;

a memory updating and storing the previously-detected state signals and the new state signal;

25

a direction controller attaining the control signal for controlling a direction of the antenna by comparing new state signals of the detection part to the previous state signals stored in the memory; and

5 an interface part connected between the antenna and the direction controller and providing the antenna with the control signal so as to control the direction of the antenna in accordance with the control signal.

10 6. The digital television receiver of claim 5, the signal of the predetermined form is a VSB signal.

7. The digital television receiver of claim 6, the signal processing part comprising:

15 a tuner tuning a wanted channel signal from channel signals received through the antenna;
an intermediate frequency automatic gain control part controlling automatically an intermediate frequency gain of the channel signal tuned by the tuner; and
20 a VSB receive chip taking a VSB signal from an output signal of the intermediate frequency automatic gain control part and providing the detection part with the VSB signal.

25 8. The digital television receiver of claim 7, the VSB receive chip comprising:

an automatic gain control part controlling a gain of an output signal of the intermediate frequency automatic gain control part;

5 a timing and carrier restoration part restoring a timing and carrier loss on an output signal of the automatic gain control part;

an equalizer equalizing an output signal of the timing and carrier restoration part;

10 a phase tracker tracking a phase of an output signal of the equalizer; and

a forward error corrector correcting a forward error on an output signal of the phase tracker and outputting the VSB signal.

15 9. The digital television receiver of claim 8, the detection part comprising:

a signal power detector detecting a power of the tuned channel signal using an automatic gain control signal from the automatic gain control part of the VSB receive chip;

20 a ghost power detector detecting a power of a ghost signal using an output signal from the equalizer or an output signal of the timing and carrier restoration part of the VSB receive chip; and

25 a signal vs. noise ratio(SNR) calculator calculating a ratio between a signal and a noise using an output signal of the phase tracker of the VSB receive chip.

10. The digital television receiver of claim 9, the
ghost signal power detector comprising:

5 a data segment synchronization correlative calculating a
correlation value between an I channel signal received
from the VSB receive chip and a previously-set
synchronization signal value(cf. a synchronization value
"1001" is inserted into each data segment in a VSB
transmission system);

10 a segment integrator accumulating output values of the
data segment synchronization correlative in 832
delayers;

15 a slicer providing an increased count value when the
accumulated correlation value reaches a predetermined
size;

a confidence counter increasing a count number according
to the increased count value; and

20 a maximum ghost power detection controller transferring
a ghost power ready signal and a standardization value
resulted from standardizing a maximum ghost power into a
power of a received channel signal to the direction
controller when a value of the confidence counter
reaches a reference value.

25 11. The digital television receiver of claim 10,
wherein, in the VSB transmission system, a

100-2017-0960

synchronization signal inserted into each data segment is "1001".

12. The digital television receiver of claim 9, the
5 signal vs. noise ratio calculator comprising:
a subtractor subtracting a demodulated signal constellation from a decision signal constellation;
a squarer squaring an output of the subtractor;
an accumulator accumulating output signals of the
10 squarer;
a latch delaying an output of the accumulator; and
a divider dividing an output of the latch into a window size m of the segment integrator of the ghost signal power detector.

15
13. The digital television receiver of claim 12,
wherein the signal vs. noise ratio is attained by the
following algorithms: a signal vs. noise ratio $\text{SNR} = 10\log(P_s/P_n)$; and $P_n/mse = \sigma(k \text{ is } 1 \text{ to } n)(mse/m)$,
20 where P_s is a signal power(=1), P_n is a noise power(P_n/mse), 'R_1' and 'D_1' are a demodulated signal constellation(received constellation) and a decided signal constellation(decision constellation), respectively, and 'm' designates a window size of the
25 integrator.

14. The digital television receiver of claim 8, wherein
an automatic gain control(AGC) system of the tuned
channel signal controls a gain of an intermediate
frequency signal through a electric charge pump & lag
filter from the VSB receive chip and a gain of a high
frequency signal automatically using an automatic
gain control signal delayed in the intermediate
frequency automatic gain control part.

10 15. The digital television receiver of claim 8, wherein
the intermediate frequency signal and high frequency
signal gains are controlled automatically by the VSB
receive chip in accordance with an automatic gain
control system.

15 16. The digital television receiver of claim 5, the
direction controller comprising:
a signal power tracker tracking a power of the tuned
channel signal using an output signal of the signal
power detector;
a ghost power tracker tracking a power of the ghost
signal using an output signal of the ghost power
detector;
a signal vs. noise ratio(SNR) tracker tracking a ratio
between a signal and a noise using an output of the
signal vs. noise ratio calculator;

100-EX-1755960

a tracking processor tracking states of the tuned
channel signal using output signals of the trackers in a
presently-selected antenna pattern and then changing the
antenna pattern in order stored in the memory if the
5 tracked states fail to maintain effective value sizes;
a scan processor attaining an effective signal power and
antenna pattern by varying the directionality of the
antenna using an output signal of the tracking processor
and then storing the power and pattern values in the
10 memory; and
a sort processor aligning the stored antenna pattern
values in order of the signal power values.

15 17. The digital television receiver of claim 16,
wherein the direction controller makes the scan
processor carry out the scanning again if it is
judged that there is no antenna pattern having an
effective size in the memory by the operation of the
tracking processor.

20 18. The digital television receiver of claim 16, the
direction controller further comprising general
registers including a pointer register representing
an address of the memory, a direction register
Dir_reg, always storing the present antenna state
25 value, an angle register storing temporarily a state

value of the antenna, and a power register storing a power value of a received signal temporarily.

19. In a digital television receiver having an antenna
5 of which direction is adjustable, an antenna controller, and a memory, a method of controlling an antenna of a digital television receiver comprising:
10 a step (a) of storing an effective power of the channel signal received through the antenna in the memory by rotating the direction of the antenna and selecting an antenna pattern when a maximum signal power is detected;
15 a step (b) of aligning the stored antenna patterns in order of sizes of the stored signal powers; and
 a step (c) of detecting states of the channel signal, a power of the channel signal, a maximum ghost power, and a signal vs. noise ratio and then changing a pattern of the antenna in accordance with the detected values.

20. The method of claim 19, the step (a) comprising:
20 a step of initializing the antenna controller and detecting whether a channel signal exists through the antenna;
 a step of storing an effective power of the channel signal in the memory with the very antenna pattern wherein the channel signal is detected by rotating a

TRADE EXPERTS INC.

directionality of the antenna to a predetermined angle when the channel signal is detected; and a step of selecting an antenna pattern, when a maximum signal power is detected, as an optimal pattern.

5

21. The method of claim 1, wherein the predetermined angle is 360°.

22. The method of claim 19, the step (c) comprising:

10 a step of detecting states of the tuned channel signal, a power of the channel signal, a maximum ghost power, and a signal vs. noise ratio in the present antenna pattern through the antenna controller;

15 a step of judging whether the detected values maintain effective sizes;

a step of changing the antenna pattern in order of the aligned and stored antenna patterns if the present antenna pattern needs to be changed in accordance with a result of the judging step; and

20 a step of carrying out the step (a) again using the antenna controller to attain an effective antenna pattern if there is no effective one in the entire antenna patterns stored in the memory.